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(54) **HOLDER FOR MOUNTING A HAND TOOL TO A SURFACE AND KIT INCLUDING THE SAME**

HALTERUNG ZUR BEFESTIGUNG EINES HANDWERKZEUGS AN EINER OBERFLÄCHE UND
SATZ MIT DIESER HALTERUNG

SUPPORT POUR LE MONTAGE D'UN OUTIL À MAIN SUR UNE SURFACE ET KIT COMPRENANT
CE SUPPORT

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(56) References cited:

WO-A1-2012/163411 WO-A1-2016/178952

KR-A- 20120 124 742 US-A1- 2009 108 153

US-A1- 2009 108 153 US-A1- 2014 131 412

US-A1- 2014 131 412 US-A1- 2015 136 922

US-A1- 2015 136 922 US-B1- 9 200 667

US-B2- 9 732 785

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Description

FIELD OF THE DISCLOSURE

[0001] The disclosure relates to a system and method for vibrating a body part to reduce pain during piercing or medical treatment of the skin, and more particularly to applying vibration using a handheld tool with a vibrating tip having protrusions, and further to a stand for supporting the handheld tool. In particular, the disclosure relates to a holder for mounting such a handheld tool to a surface according to the preamble portion of claim 1.

BACKGROUND OF THE DISCLOSURE

[0002] Procedures for reducing pain when injecting a material into the body, removing a body fluid or body tissue, or otherwise piercing the skin or body tissue, include (a) placing a very cold material against the skin or flesh of the patient at the piercing site, (b) applying a topical treatment to the skin or flesh at the piercing site, which temporarily numbs the skin or flesh or (c) rapidly manually massaging the skin or tissue at the injection site while performing the injection.

[0003] US 2009/108153 A1 discloses a holder as mentioned in the preamble portion of claim 1.

SUMMARY OF THE DISCLOSURE

[0004] In an embodiment of the disclosure, a holder for mounting a hand tool to a surface comprises: a suction cup positionable upon the surface, the suction cup having a central area; a yoke connected to the central area, the yoke movable in a vertical direction relative to the surface, to distort the suction cup and create an area of low pressure between the suction cup and the surface, to secure the suction cup and yoke to the surface, the yoke including a cam engagement surface; a frame including a cradle shaped to receive and support the hand tool when a hand tool is placed onto the holder; a base; an extension connecting the base and the cradle; and a cam pin movable within the frame, the cam pin including a cam profile slideably engageable with the cam engagement surface of the yoke to push the yoke vertically away from the surface or allow the yoke to move towards the surface to increase or decrease the pressure between the suction cup and the surface, whereby the yoke is biased by a resilient bumper.

[0005] In variations thereof, the cradle includes at least two flexible legs; the frame is fabricated from resilient plastic; and/or the cradle includes at least one of a projection or aperture, and wherein the hand tool includes the other of a mating aperture or projection, respectively, and wherein the projection and aperture mate when the hand tool is positioned within the cradle, to thereby maintain a predetermined position of the hand tool within the holder.

[0006] In other variations thereof, the cradle is con-

nected to the frame at a non-orthogonal angle with respect to the surface when the holder is connected to the surface using the suction cup; the pin moves along a plane parallel to the surface when the holder is mounted to the surface; the pin passes through one or more apertures in the frame, and wherein an end of the pin forms an exposed button which can be pressed to move the pin; the cam profile of the cam pin extends at a depth within the cam pin that varies along a longitudinal axis of the cam pin; the cam profile faces away from the surface when the holder is positioned upon the surface; the cam engagement surface faces toward the mounting surface when the holder is positioned upon the mounting surface; and/or the cam profile is oriented on a face of cam pin which faces away from the mounting surface when the holder is positioned upon the surface, whereby the cam engagement surface is in operative engagement with the cam profile as the pin is moved.

[0007] In still further variations thereof, the yoke is biased in the direction of the surface relative to the frame, when the holder is mounted upon the surface; the bumper is affixed to the frame along a portion of its length, leaving a free portion in engagement with the yoke; the yoke is co-molded to the suction cup; and/or the yoke is a different material than the suction cup.

[0008] In another embodiment of the disclosure a kit includes the holder of claim 1, a hand tool and a container sized and dimensioned to house and limit free movement of at least: the holder of claim 1, and the hand tool. In a variation thereof the container is further sized and dimensioned to further house and limit free movement of a lancet driver tool, a plurality of lancets, a blood glucose reader, and a container sized to contain glucose test strips.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] A more complete understanding of the present disclosure, and the attendant advantages and features thereof, will be more readily understood by reference to the following detailed description when considered in conjunction with the accompanying drawings wherein:

FIG. 1 depicts a top view of a vibratory tip of the disclosure, having a plurality of nubs;

FIG. 2 depicts a side view of the tip of FIG. 1;

FIG. 2A depicts a detail view of a distal end of the tip of FIG. 2;

FIG. 2B depicts alternative cross-sectional profiles for nubs of the disclosure;

FIG. 3 depicts a perspective bottom view of an alternative vibratory tip of the disclosure, including an alternative arrangement of nubs;

FIG. 4 depicts a top view of the tip of FIG. 3;

FIG. 5 depicts a distal end perspective view of the tip of FIG. 3;

FIG. 6 depicts a proximal end perspective view of the tip of FIG. 3;

FIG. 7 depicts a perspective top view of an alternative

vibratory tip of the disclosure, including an alternative arrangement of nubs;

FIG. 8 depicts a top perspective view of the tip of FIG. 7;

FIG. 9 depicts a side perspective view of the tip of FIG. 7;

FIG. 10 depicts a top view of a further alternative vibratory tip of the disclosure, including another arrangement of nubs;

FIG. 11A depicts a side view of an end of the extension arm of FIG. 10;

FIG. 11B depicts a back view of the extension arm end of FIG. 10;

FIG. 11C depicts a front view of the extension arm end of FIG. 10;

FIG. 12 depicts a perspective side view of an instrument and holder of the disclosure;

FIG. 13 depicts the instrument of FIG. 12, with a vibratory tip and holder removed;

FIG. 14 depicts a cross-section of an alternative device of the disclosure, bisected approximately vertically;

FIG. 15 depicts a top front perspective view of the holder of FIG. 13;

FIG. 16 depicts a rear perspective view of the holder of FIG. 13;

FIG. 17 depicts an exploded view of the holder of FIG. 15, with the suction cup, yoke, and cam pin removed;

FIG. 18 depicts an exploded view of internal element of the holder of FIG. 17;

FIG. 19 depicts a bottom view of the holder of FIG. 17, with internal elements removed;

FIG. 20 depicts a perspective view of a suction cup of the disclosure, with an unattached yoke;

FIG. 21 depicts alternative tip shapes in accordance with the disclosure; and

FIG. 22 depicts a kit containing an instrument of the disclosure and associated therapeutic elements.

DETAILED DESCRIPTION OF THE DISCLOSURE

[0010] As required, detailed embodiments are disclosed herein;

however, it is to be understood that the disclosed embodiments are merely examples and that the systems and methods described below can be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present subject matter in virtually any appropriately detailed structure and function. Further, the terms and phrases used herein are not intended to be limiting, but rather, to provide an understandable description of the concepts.

[0011] The terms "a" or "an", as used herein, are defined as one or more than one. The term plurality, as

used herein, is defined as two or more than two. The term another, as used herein, is defined as at least a second or more. The terms "including" and "having," as used herein, are defined as comprising (i.e., open language).

The term "coupled," as used herein, is defined as "connected," although not necessarily directly, and not necessarily mechanically.

[0012] The disclosure reduces pain to a patient being injected, for example with an anesthetic, serum, vitamins, vaccine, or other medically efficacious liquid. The disclosure can be easily and inexpensively utilized during a medical, veterinary or dental procedure to almost completely or substantially eliminate the pain attendant an injection as it punctures the skin or flesh of the patient. The disclosure also reduces pain due to any disturbance of the skin or underlying tissues, for example the pain which accompanies puncture of the skin associated with removal of fluids from the body. Examples include while removing blood for a glucose test or other blood analysis; during a puncture associated with treatment of the skin, such as acne or blisters; and for other fluid withdrawals, for example during phlebotomy, paracentesis, aspiration, or synovial fluid withdrawal.

[0013] The disclosure provides a disposable tip and a hand-held apparatus, which in an embodiment has the form of an instrument 10, for vibrating a skin or tissue area. In various embodiments, a vibrating end or tip 40 contacts at least two skin or tissue areas, or a circular skin or tissue area, immediately at an injection site, puncture site or site of a painful contact, and does so while the potentially painful therapeutic procedure takes place. Pain can be caused by injection, for example of a liquid anesthesia, serum, vitamins, vaccine, or other medical or dental efficacious material, into the skin or tissue at the injection site. Typically, a region of interest for a dentist can be the entire oral mucosa area and underlying bone, whereas the region of interest for a medical doctor can be the whole body and underlying bone. For a non-medical professional, the region of interest could be the fingertip or other area a lancet will prick to obtain blood for a glucose measure, for example. The disclosure is applicable to any of these situations, for any area of the body.

[0014] The method of the disclosure consists in vibrating tissue of a human or animal in proximity to a preselected puncture or injection site on the human or animal body while simultaneously puncturing or injecting by a needle or like instrument a liquid at the preselected site. The vibration can be effective if transmitted to a circular or other shaped area of body tissue, which can include bone underlying skin at a puncture or injection site, and particularly on opposite sides of the site.

[0015] Background helpful in understanding the disclosure can be found in the following documents:

U.S. Patent Application 60/661,497 filed September 20, 2004;

U.S. Patent Application 60/707,754 filed August 12,

2005;
 PCT Application PCT/US05/33769 filed September 19, 2005;
 U.S. Patent Application 61/163,945 filed March 27, 2009;
 PCT Application PCT/US09/66033 filed November 29, 2009;
 PCT Application PCT/US10/28858 filed March 26, 2010;
 U.S. Patent Application 13/179,674 filed July 11, 2011, now U.S. Patent 8,668,664;
 U.S. Patent Application 13/225,782 filed September 6, 2011, now U.S. Patent 8,662,952;
 U.S. Patent Application 13/253,572 filed October 5, 2011;
 PCT Application PCT/US12/53744 filed September 5, 2012;
 U.S. Patent Application 61/531,264 filed September 6, 2011;
 PCT Application PCT/US12/53943 filed September 6, 2012;
 U.S. Patent Application 61/909,544 filed November 27, 2013;
 PCT Application PCT/US14/67587 filed November 26, 2014;
 U.S. Patent Application 62/155,769 filed May 1, 2015;
 U.S. Patent Application 14/803,535 filed July 20, 2015;
 U.S. Patent Application 62/208,860 filed August 24, 2015;
 International Patent Application Number PCT/US2016/029971 filed April 29, 2016, and published as WO2016/178952 A1; and
 International Patent Application Number PCT/US2016/029938 filed April 29, 2016, and published as WO/2016/178941 A1.

[0016] With reference to FIGS. 12, 14, and 22, an instrument 10 includes a handle 12 which contains a battery (not shown), and means to charge the battery, for example a cable, plug, or induction coil (not shown). A control circuit 28 is disposed within handle 12, and controls the operation of a motor 24. A switch 60 (FIG. 13) is pressed by a user of instrument 10 to cause the motor to start. A cam 100A is connected to the motor output, and causes pivotal movement of a vibration transmitting rod 30A about a pivot at O-ring 64. A patient contacting tip 40 is connected to an end of rod 30A opposite cam 100A, and vibrates due to the eccentric path of cam 100A. Tip 40 can have a smooth or rough surface, can include ridges or other shapes, or can include one or more nubs 280 positioned on a front, end, or back surface thereof. Nubs 280 facilitate transmission of vibration into the patient, which affects the nervous system of the patient to reduce a sensation of pain of the therapeutic procedure during vibration.

[0017] Handle 12 is shaped to be grasped by the hand

of the user, thereby enabling instrument 10 to be used as a hand tool. A holder 400A can be used to store or temporarily hold instrument 10, or can be used to hold instrument 10 during a therapeutic procedure.

[0018] Tip 40 can be either permanently or removably mounted to handle 12. In an embodiment, a twist lock connection is used to mount tip 40. Alternatively, a snap-fit, magnetic, threaded connection, or interference fit, for example, can be used to releasably secure tip 40 to a remainder of instrument 10.

[0019] In an embodiment of the disclosure, instrument 10 is fabricated with a minimal or no use of threaded fasteners, as these can tend to be vulnerable to loosening when instrument 10 is used to produce vibration at particular frequencies. This effect can be mitigated by using a thread locking compound or material. In an embodiment, motor 24 is mounted within handle 12 by being soldered or welded to metallic tabs which are adhered or co-molded with an interior portion of handle 12. Likewise, battery contacts and other electrical or mechanical contacts can be inserted into retaining channels formed within a body or other component of handle 12. Instrument 10 can further be improved by using lithium or state of the art batteries which reduce weight and/or provide an extended run time when charged.

[0020] In various embodiments of the disclosure, reuse of an end piece such as a vibrating tip of the instrument can be prevented, to avoid cross-contamination between patients. In one embodiment, the tip is broken when removed. In another embodiment, electromagnetic communication is established between an electronic tag on a tip and an electronic circuit within the body of the instrument. In this manner, a use count and validation of the tip can be monitored, and activation of the instrument can be disabled if the tip should be replaced after a period of time, or a predetermined number of uses, which are indicative of potential reuse between patients. In other embodiments, the tip can be re-used a number of times.

[0021] The embodiment disclosed herein is a tool for relieving pain associated with an injection, or any other piercing of the skin. For example, in addition to injections, the disclosure applies to other pain inducing procedures applied to any body tissue, such procedures including cauterizing, application of laser light, application of chemicals, or insertion of sutures, clips, or staples, or to pierce the skin to withdraw a sample of a body fluid. Further, it should be understood that the disclosure can be used to control the use of any tool tip, whether used in dentistry, general medicine, or within an industrial application, for example a grinding or boring machine tool tip, or other end effector.

[0022] Referring now to FIGS. 1-2, a tip 40 is adapted to attach to an instrument 10, to transmit vibration to a distal tip portion, to thereby transmit the vibratory energy to the patient through contact with the treatment area. The vibration caused by contact with a device of the disclosure produces a therapeutic effect which results in a diminution of the sensation of pain associated with a ther-

apeutic procedure, for example a skin puncture or excision, or a treatment of body tissue.

[0023] Tip 40 can have any of a variety of shapes, some of which are disclosed herein, which are adapted or adaptable to the shape and dimension of body tissue to be made less sensate to pain by a device of the disclosure. Such shapes can include for example pronged, ring shaped, and adapted to engage a finger. The tip can likewise have RFID or wireless features, and/or tearing or other reuse controlling features. For example, an RFID feature can be used to count, for example by a computing circuit within handle 12, a number of times a tip 40 has been used, for example more than once, to prevent cross contamination between patients, and to maintain consistent performance. Tip 40 can include an overmold, and/or can be molded with different layers and components, to present a smooth external surface, and to prevent the intrusion of body fluids or other debris into instrument 10.

[0024] With reference to FIG. 2A, tip 40 disclosed herein is additionally provided with nubs 280 having a small cross-sectional area with "w" relative to the cross-sectional area of an associated extending arm 81. For example, w can be, for example, typically 0.25mm to 3 mm, or as small as 0.05 and as large as 5mm depending upon the size of the patient being treated and the cross-sectional area of arm 81, and may be further provided with a pointed distal profile, a rounded distal profile as shown, an alternate shaped profile, or a combination of profiles. Non-limiting examples of oval, polygonal, and pointed nub 280 profiles are shown in FIG. 2B. In FIGS. 3-4, the profile of nubs 280A are truncated cylinders, which can have a flat distal end profile as shown, or which can have a distal end profile that forms an angle with respect to a longitudinal axis of the nub 280A.

[0025] Referring again to FIGS. 1-2, it may be seen that nubs 280 are positioned on two or more sides of extension 81, as may be the case with any other nub shapes shown or described herein. In FIGS. 1-2, nubs 280 are positioned on opposite sides and upon a distal end 282 of extensions 81, however they may be positioned on all sides, or any number of surfaces of extension 81.

[0026] Without being bound to any particular theory, the inventors have found that nubs 280/280A (hereinafter all nubs may collectively be referred to as 280) intensify the pain-relieving characteristics of tip 40 and instrument 10. For example, the narrower distal shape of nub 280 may serve to direct the vibratory energy more deeply into the skin. Further, the increased instance of points of contact with the skin may increase vibratory contact. Likewise, a combination of deeper skin penetration of vibration over a relatively greater number of contact points may result in an overall greater transfer of vibratory energy into the patient at the site of application of nubs 280. Again, without being bound to a particular theory, a higher number of nerve sensors may be occupied conducting sensed vibratory contact, resulting in fewer nerve sensors carrying sensed pain, or nerve sensors may

have a diminished capacity to convey sensed pain due to signals being conveyed relating to vibratory contact.

[0027] Additionally, by positioning one or more nubs 280 upon different sides of arm extension 81, different parts of the patient's anatomy may be subjected to vibratory energy. For example, in the mouth, it would be possible to stimulate the gingivae and cheek simultaneously. It should be understood, however, that a different but beneficial therapeutic benefit can be obtained by providing a tip 40 without nubs 280.

[0028] In the embodiment of FIGS. 7-9, as with the embodiment of FIGS. 1-2, a plurality of nubs 280C are provided, positioned to extend from the front and back of extension 81. In the embodiment of FIG. 10, there is only a single nub 280C provided at each face, on each arm extension 81. The presence of a single nub 280C per face of arm extension 81 can serve to focus vibratory energy over a very small area, which may provide a different and useful effect, depending upon a particular therapeutic application, with respect to the multiple nubs 280 per face, as shown in FIGS. 1-2. In a variation of FIG. 10, nub 280C may be omitted on the front face 286 or rear face 288. As can be seen in FIGS. 7-9, arms 81 are spaced at opposite sides of gap, or alternatively adjacent a central lens 53 from which light is emitted.

[0029] In FIGS. 7-9, it may be seen that nubs 280 may alternatively have the same size and shape whether they are positioned on the front, end, or back of extension arm 81. While a plurality of nubs 280 are shown in FIG. 7-9, it should be understood that a single nub 280 can be provided upon any one of the front, end, and side portions of extension arm 81.

[0030] In at least some embodiments of tip 40, extension arms 81 can be bent to facilitate a therapeutic procedure using instrument 10. For example, arms 81 can be bent to alter a fit between a cheek and gums, or otherwise bent to better fit the anatomy of a specific patient. In an embodiment, a wire or other stiff frame, for example of metal, can be placed into a mold prior to injection of overmolded thermoplastic or other material. Alternatively, the molded material can be selected from a material which at least substantially retains a shape once bent, and no underlying wire or frame is needed.

[0031] As can additionally be seen in FIGS. 7-8, a light may be emitted at a location or lens 53, and an RFID tag 370 can optionally be provided upon or within tip 40.

[0032] In FIGS. 10-11, for each extension arm 81, nub 280C has a curvature extending across a front face portion 286 (FIG. 11A, 11B). Similarly, a nub 280D extends across a rear face portion 288 (FIGS. 11A, 11C). In an embodiment, a size and location of a radius of the nubs 280C at the front and rear facing portions 286, 288 define curves having differing radius width and radial centers. In this manner, a shape of nubs 280 can be targeted very specifically to the anatomy typically found at a target usage site.

[0033] FIG. 14 depicts a cross-section of an instrument 10 in accordance with the disclosure, which has an al-

ternative tip engagement configuration with respect to that shown in FIGS. 12 and 13. In FIG. 14, a vibration transmitting rod 30A transmits motion produced within handle 12 to vibration along an exterior surface of tip 40. Rod 30A can optionally transmit light as well as vibration, for example by being fabricated with a light transmissive material or having a light channel, or by producing light within, to a lens 53 (not shown in FIG. 14).

[0034] A base of rod 30A includes a base recess 68 into which an eccentric cam 100A rotates. An electric motor 24 is affixed to handle 12, and has an output shaft 70 which is connected to circular cam 100A having eccentric cam lobes 104. Motor 24 can be controlled by an electronic circuit 28, and can be activated by a switch 60 (FIG. 13), which either mechanically completes an electrical connection to motor 24, or which signals to circuit 28 that it is desired to start motor 24.

[0035] In an embodiment extension arms 81 have been found to produce a therapeutic pain relieving benefit if caused to vibrate at an amplitude of 0.1 to 5 mm, although a greater or lesser amplitude is possible, if a therapeutic procedure indicates such a need. It should be understood that amplitude will vary whether arms 81 are suspended in air, or pressed with a light pressure on the skin. The foregoing values are for amplitude based upon a light pressure upon the skin. Amplitude in air may be greater, for example 2.0-2.5 mm, which results in amplitude of 1.0-1.5 mm with light pressure upon the skin. Greater amplitude can be created, for example, by using a lower frequency and increasing power to motor 24. A frequency within the range of 100 to 300 Hz has been found to be therapeutically beneficial for reducing pain, although a slower or faster frequency can be effective.

[0036] Without being bound to any particular theory, it appears that by cycling or pulsing as described, the brain does not get accustomed to, or habituate to the vibration, and thus the vibrations remain effective. Patterns and durations of pulsing or cycling can be used, as best determined by the practitioner as observed to reduce habituation to the vibration among various patients or patient demographics. To this end the electronic circuit 28 can be used to control pulsing to obtain a desired on/off duty cycle. The medical practitioner can apply vibration using instrument 10 for a period prior to potentially causing pain, for example for a period of 1 to 90 seconds, and can continue to apply pressure after treatment, also for a period of 1 to 90 seconds, depending on the body tissue affected, tip shape selected, and the type of treatment, for example.

[0037] In an embodiment for one type of therapeutic procedure, motor 24 is energized using one or more lithium batteries. The vibration at the free ends of arms 81 can vary from about 1.0 mm to about 3.0 mm, in an embodiment advantageously 1.5 mm to 2.0 mm. In some embodiments, the vibrating tip is placed on or near the location for anywhere from around 3 seconds to around 15 seconds, with the vibration continually applied. In other embodiments, a duty cycle of about 1.05 seconds with

on pulsing of about 1 sec. and off of about 0.05 seconds is used. Depending on a patient's physiology and the desired application, at least one of the vibration amplitude and duty cycle can be varied to be more effective.

[0038] A nozzle 34 is affixed to handle 12, and includes an internal support 62 for an O-ring 64. Vibration transmitting rod 30A passes through and is pivotably supported by O-ring 64. As cam 100A rotates, base recess moves in an orbit about output shaft 70, which orbital motion is translated to a distal end 72 of vibration transmitting rod 30A via pivoting about O-ring 64. Distal end 72 inserts into a recess 74 within tip 40. Rod 30A and tip 40 can be attached by any other means, including alternatively providing an extension on tip 40 which inserts into a recess in distal end 72, or distal end 72 and tip 40 can be attached by a fastener, magnet, or other means. Such attachment means is advantageously releasable, so that a new tip 40 can be used for each new patient or treatment.

[0039] An overmold or sleeve 76 can be provided to prevent passage of debris between an exterior of instrument 10 and an interior of nozzle 34. Tip 40 can be separated from instrument 10 together with sleeve 76, nozzle 34, and transmitting rod 30A. Alternatively, tip 40 can be removed together with or separated from sleeve 76, leaving the remaining components in connection with instrument 10, or may be removed together with various combinations of these elements. In an embodiment, nozzle 34 forms a twist-lock connection with handle 12, whereby tip 40 can be removed or attached to instrument 10 by radial rotation of tip 40 including nozzle 34 with respect to handle 12.

[0040] With reference to FIGS. 12 and 15-20, an instrument 10 cooperative with a tip 40, is supported by a mounting base or holder 400A. A suction cup 430A is positioned at a one end of a base extension 404A, and an instrument holder 412 is positioned at an opposite end of extension 404A. Holder 400A can be sized and shaped to releasably and securely retain any instrument 10 of the disclosure as described herein. FIG. 13 illustrates an embodiment of instrument 10 without a tip 40 attached, in accordance with one embodiment of tip 40.

[0041] Instrument holder 412 is shaped to slidably and releasably retain handle 12 of instrument 10, and can form a tapered profile which mates with a tapered profile of handle 12, to enable insertion of instrument 10 to a desired predetermined extent, whereby a sufficient portion of handle 12 extends from holder 412 to enable handle 12 to be easily grasped and pulled to remove instrument 10. As an alternative to a tapered fit, handle 12 can be shaped to contact a surface of instrument 10 to prevent insertion beyond a desired predetermined extent.

[0042] In addition, or as an alternative to the foregoing, holder 412 412A and handle 12 can be provided with mating detent portions, such as a protrusion 442A on one part, and a recess 444A on another, which engage when instrument 10 has been inserted sufficiently. In the embodiment shown, protrusion 442A is disposed on one or

more of a resilient cradle or arm 414, integrally molded with holder 412. Recess 444A is disposed within handle 12, although it should be understood that a recess can be provided within holder 412, and a protrusion can be provided upon handle 12. When instrument 10 is inserted, arm 414 bends to enable protrusion 442A to be displaced by handle 12. When protrusion 442A is aligned with recess 444A, arm 414 pushes protrusion 442A into recess 444A. An alignment of protrusion 442A and recess 444A can be achieved by mating surfaces in an interior surface of holder 412, and corresponding mating exterior surfaces of instrument 10, which contact each other to mutually guide and orient instrument 10 as it is inserted into holder 412.

[0043] While a vibratory instrument 10 is illustrated and described, it should be understood that holder 400A of the disclosure can be used with any hand tool, wherein a cradle formed of one or more arms 414 is adapted to the shape of the particular hand tool, and wherein protrusions 442A or recess 444A are provided on the adapted cradle and hand tool, respectively.

[0044] Holder 412 includes two opposed arms 414 which can be formed with a resilient material, whereby arms 414 can bend to enable engagement and disengagement of the mating portions 442A, 444A. Alternatively, resilient arms 414 can be formed to define, when relaxed, an interior diameter which is smaller than a diameter of instrument 10 or handle 12, whereby a wedging force is achieved when instrument 10 has been inserted, which causes instrument 10 to be securely retained between arms 414 when sufficiently inserted.

[0045] Holder 412 can further be disposed at an angle with respect to a plane defined by a bottom of suction cup 430A, which is intended to be secured upon a surface upon which holder 400A is to be mounted. In this manner, gravity can be employed to retain instrument 10 within holder 412. In the embodiment shown, an angle of 15 degrees is formed, although any angle can be used, for example anywhere from 10 to 30 degrees, although any angle between zero and vertical, inclusive, can be used in accordance with the disclosure. In an embodiment, the angle can be selected by rotating holder 412 about a pivot (not shown) which connects holder 412 to base extension 404A.

[0046] Base extension 404A increases a height of holder 412 above a surface to which device stand is mounted. In this manner, tip 40 does not contact the surface when instrument 10 is in holder 412, and handle 12 is spaced from the surface to be easily grasped by a hand.

[0047] With reference to FIGS. 15-20, suction cup 430A is positioned beneath a circular base 420A, the latter being attached to base extension 404A. Suction cup 430A includes a planar suction base 426A, and a peripheral wall 426B extending vertically, with respect to a mounted position, from suction base 426A, which surrounds and orients circular base 420A with respect to suction cup 430A.

[0048] Suction cup 430A is connected at a center of

suction base 426A to a yoke 432A, the latter forming an aperture 452. In FIG. 18, yoke 432A and suction base 426A are integrally formed or co-molded together. FIG. 20 illustrates that yoke 432A and suction base 426A can alternatively be formed as separated parts joined by any known method, such as a fastener, including adhesive.

[0049] A cam engagement surface 434A is provided upon yoke 432A, facing towards aperture 452. Yoke 432A is inserted within a channel 436A formed within base extension 404, to be slideable vertically with respect to a mounting plane of holder 400A. Suction cup, through attachment to yoke 432A, has the ability to swivel or flex laterally and to thereby lie flat upon a mounting surface adjusting for irregularities in the shape of parts or in mounting surface. In an embodiment, cam engagement surface 434A faces toward the mounting surface when holder 400A is positioned upon the mounting surface.

[0050] A cam pin 454 passes through yoke aperture 452, and is slideably supported by opposed apertures 456 formed in base extension 404. Cam pin 454 includes a cam profile 458 which engages yoke cam engagement surface 434A, to raise and lower yoke 432A vertically, as cam pin 454 is moved horizontally, with respect to a plane of a mounting surface of holder 400A. When a relatively deep area 458' of cam profile 458 engages cam engagement surface 434A, suction base 426A is permitted to form a planar shape, and suction between suction base 426A and a mounting surface (not shown) is released, enabling holder 400A to be removed from mounting surface. In an embodiment, cam profile 458 extends at a depth within cam pin 454 that varies along a longitudinal axis of cam pin 454. In an embodiment, when the cam engagement surface 434A faces toward the mounting surface, cam profile 458 is oriented on a face of cam pin 454 which faces away from the mounting surface when holder 400A is positioned upon the mounting surface, whereby cam engagement surface 434A is driven into operative engagement with cam profile 458.

[0051] When suction cup 430A is in planar, sealing contact with mounting surface, and cam pin 454 is moved to gradually place a relatively shallow area 458" of cam profile 458 into engagement with cam engagement surface 434A. In so doing, a center area of suction base 426A is pulled vertically, distorting the suction base to form an area of low pressure between suction base 426A and the mounting surface. More particularly the distorted area can have, for example, a conical or tented shape (not shown), with the vacuum present within the tented shape, thereby attaching suction cup 430A to mounting surface, and affixing holder 400A to mounting surface. Opposed ends of cam pin 454 form buttons two buttons 462, either of which extend from base extension 404A, and which may alternately be pushed to move cam pin 454 into engagement with either deep or narrow area 458', 458", to create or release suction to engage or release holder 400.

[0052] A resilient bumper 464 is positioned to have an upper end 466 secured within base extension 404A, and

a lower end 468 that freely extends within base extension 404A to lie in deformable contact with an upper portion of yoke 432A. Bumper 464 functions to continuously urge cam engagement surface 434A into contact with cam profile 458, and to press upon instrument 10 when suction cup 430A is engaged with a mounting surface. In an embodiment, a portion of yoke upper end 466 can be secured within base extension 404A to freely extend into a space between arms 414, whereby when instrument 10 is inserted into holder 400A, upper end 466 resiliently engages instrument 10, for example by pressing upon handle 12 or other portion of instrument 10, to contribute to securely holding instrument 10 within holder 400A and in contact with arms 414, whereby instrument 10 may be used 'hands free' without excessive movement or displacement due to vibration. Another form of biasing element can be used for bumper 464, including for example a coil or leaf spring, secured in a manner as described above.

[0053] Holder 400A can be fabricated of any material, for example metal, wood, plastic, including injection molded plastic, or composite material. Plastic is advantageous as it can be used in a clinical environment, and can be machine washed or wiped with disinfectant cleaners without being damaged. Further, plastic can be selected to be inherently resilient, thereby facilitating the formation of resilient arms 414. However, other materials can also be used for some or all of holder 400A, in particular metal, including shape metal alloys, for example. Non-limiting examples include thermoplastics such as Acrylic, ABS, Nylon, PLA, Polybenzimidazole, Polycarbonate, Polyether sulfone, Polyetherether ketone, Polyetherimide, Polyethylene, Polyphenylene oxide, Polyphenylene sulfide, Polypropylene, Polystyrene, Polyvinyl chloride, and Teflon.

[0054] Suction cup 430A can be fabricated from any of the foregoing materials which are soft and pliable at room temperature, further including rubber or a polymeric analog, such as a thermoplastic elastomer, which can be a Styrenic block copolymers (TPE-s), Thermoplastic olefins (TPE-o), Elastomeric alloys (TPE-v or TPV), Thermoplastic polyurethanes (TPU), Thermoplastic copolyester, Thermoplastic polyamides. Other materials can include natural or synthetic rubber, or silicone based materials, as understood within the art. Similar materials can be used for bumper 464.

[0055] Holder 400A can be fabricated using any known method which can produce parts as a unit, as shown, or in portions which can be assembled, for example by gluing, riveting, heat welding, snap fitting, or interference fitting, for example. Parts can be produced by extrusion, grinding, molding, 3D printing, casting, or any other suitable method. A finish can be formed during production, or a coating or painted finish can be applied after production.

[0056] Accordingly, the disclosure provides a mounting base and holding system for table or wall mounting of an instrument of the disclosure. In use, holder 400A,

including suction cup 430A, are pressed firmly downward against the surface upon which holder 400A is to be mounted, by the user. In the process of this action the suction cup 430A is flattened at least partially and displaces air beneath it, until base 420 presses against a circular upper surface of suction base 420A. To increase suction, pin 454 is moved laterally, further raising a center of suction base 420A. Alternatively, substantially all suction is created by moving pin 454 laterally.

[0057] With reference to FIG. 21, alternative tip 40 shapes are presented, including elongate loop 40A, short hook 40B, ring 40C, open box 40D, fork 40E, single shaft 40F, single shaft with terminating bumps 40G, curved hook 40H, L-shape 40J, and open hook 40K. A medical practitioner can select a particular shape which best fits the anatomical treatment site, and which best transmits therapeutic vibration to the patient for the purposes stated herein. As with other embodiments of tip 40 described herein, the shaped tips 40A-40J can be bent to, for example, alter the desired shape to improve a fit, visibility, or to match a shape which has demonstrated improved results. For various tip shapes, it can be advantageous to orient body tissue at an angle with respect to a longitudinal axis of vibration of tip 40. For example, with reference to the tip of FIG. 12, a finger is placed orthogonal to a longitudinal axis of handle 12, a side portion of the finger thereby abutting both stop members 90. An injection, for example, can thereafter be made through the circular opening 92.

[0058] FIG. 22 depicts a kit 600 containing instrument 10, holder 400A, and components useful for a therapeutic treatment for diabetes. While kit 600 is targeted to diabetes, it should be understood that other kits can be formed which include instrument 10 and holder 400A, to be used for reducing pain in other therapeutic procedures. In the embodiment of FIG. 22, kit 600 includes a sealable case 602, a lancing device 604, lancets 606, instrument 10, holder 400A, a container of test strips 608, and a blood glucose analyzer 610, supported in a pouch 612.

[0059] All references cited herein are expressly incorporated by reference in their entirety. It will be appreciated by persons skilled in the art that the present disclosure is not limited to what has been particularly shown and described herein above. In addition, unless mention was made above to the contrary, it should be noted that all of the accompanying drawings are not to scale. There are many different features to the present disclosure and it is contemplated that these features may be used together or separately. Thus, the disclosure should not be limited to any particular combination of features or to a particular application of the disclosure. Further, it should be understood that variations and modifications of the subject matter of the disclosure might occur to those skilled in the art to which the disclosure pertains. Accordingly, all expedient modifications readily attainable by one versed in the art from the disclosure set forth herein that are in accordance with the disclosure are to be in-

cluded as further embodiments of the present disclosure.

Drawing References:

[0060] 10 Instrument; 12 Handle; 24 Motor; 28 Electronic Circuit; 30A Vibration Transmitting Rod; 34 Nozzle; 40, 40A-H, 40J-K Tip; 53 Lens; 60 Switch; 62 O-ring Support; 64 O-ring; 68 Rod Base Recess; 70 Output Shaft; 72 Rod Distal End; 74 Tip Recess; 76 Sleeve; 81 Extending Arm; 100A Cam; 104 Cam Lobes; 280, 280A-D Nubs; 282 Arm Distal End; 286 Arm Front Face Portion; 288 Arm Rear Face Portion; 370 RFID Tag; 400A Holder; 404A Base Extension; 412 Instrument Holder; 414 Resilient Cradle/Arm; 420A Circular Base; 426A Planar Suction Base; 426B Peripheral Wall; 430A Suction Cup; 432A Yoke; 434A Cam Engagement; 436A Base Channel; 442A Handle or Holder Protrusion; 444A Handle or Holder Detent; 452 Yoke Aperture; 454 Cam Pin; 456 Base Apertures; 458 Cam Profile; 458' Cam Profile Deep Area; 458' Cam Profile Shallow Area; 462 Cam Pin Buttons; 464 Resilient Bumper; 466 Bumper Upper End; 468 Bumper Lower End; 600 Kit; 602 Case; 604 Lancing Device; 606 Lancets; 608 Container of Test Strips; 610 Blood Glucose Analyzer; 612 Pouch.

Claims

1. A holder (400A) for mounting a hand tool (10) to a surface (540), the holder (400A) comprising:

a suction cup (430A) positionable upon the surface (540), the suction cup (430A) having a central area;
 a yoke (432A) connected to the central area, the yoke (432A) movable in a vertical direction relative to the surface (540), to distort the suction cup (430A) and create an area of low pressure between the suction cup (430A) and the surface (540), to secure the suction cup (430A) and yoke (432A) to the surface (540), the yoke (432A) including a cam engagement surface (434A);
 a frame including

a cradle (414, 416) shaped to receive and support the hand tool (10) when a hand tool (10) is placed onto the holder (400A);
 a base (400);
 an extension (404A) connecting the base (400) and the cradle (414, 416); and

a cam pin (454) movable within the frame, the cam pin (454) including a cam profile (458) slidably engageable with the cam engagement surface (434A) of the yoke (432A) to push the yoke (432A) vertically away from the surface (540) or allow the yoke (432A) to move towards the surface (540) to increase or decrease the pressure

between the suction cup (430A) and the surface (540),

characterized in that

the yoke (432A) is biased by a resilient bumper (464).

2. The holder (400A) of claim 1, wherein the cradle (414, 416) includes at least two flexible legs.
3. The holder (400A) of claim 1, wherein the cradle (414, 416) includes at least one of a projection (442A) or aperture, and wherein the hand tool (10) includes the other of a mating aperture (444A) or projection, respectively, and wherein the projection (442A) and aperture (444A) mate when the hand tool (10) is positioned within the cradle (414, 416), to thereby maintain a predetermined position of the hand tool (10) within the holder (400A).
4. The holder (400A) of claim 1, wherein the cradle (414, 416) is connected to the frame at a non-orthogonal angle with respect to the surface (540) when the holder (400A) is connected to the surface (540) using the suction cup (430A).
5. The holder (400A) of claim 1, wherein the pin (454) moves along a plane parallel to the surface (540) when the holder (400A) is mounted to the surface (540).
6. The holder (400A) of claim 1, wherein the pin (454) passes through one or more apertures (456) in the frame, and wherein an end of the pin (454) forms an exposed button (462) which can be pressed to move the pin (454).
7. The holder (400A) of claim 1, wherein the cam profile (458) of the cam pin (454) extends at a depth within the cam pin (454) that varies along a longitudinal axis of the cam pin (454).
8. The holder (400A) of claim 7, wherein the cam profile (458) faces away from the surface (540) when the holder (400A) is positioned upon the surface (540).
9. The holder (400A) of claim 1, wherein the cam engagement surface (434A) faces toward the mounting surface (540) when the holder (400A) is positioned upon the mounting surface (540).
10. The holder (400A) of claim 9, wherein the cam profile (458) is oriented on a face of cam pin (454) which faces away from the mounting surface (540) when the holder (400A) is positioned upon the surface (540), whereby the cam engagement surface (540) is in operative engagement with the cam profile (458) as the pin (454) is moved.

11. The holder (400A) of claim 1, wherein the yoke (432A) is biased in the direction of the surface (540) relative to the frame, when the holder (400A) is mounted upon the surface (540). 5
12. The holder (400A) of claim 1, wherein the bumper (464) is affixed to the frame along a portion of its length, leaving a free portion in engagement with the yoke (432A). 10
13. The holder (400A) of claim 1, wherein the yoke (432A) is co-molded to the suction cup (430A) or the yoke (432A) is a different material than the suction cup (430A).
14. A kit (600) including the holder (400A) of claim 1, a hand tool (10) and a container (602) sized and dimensioned to house and limit free movement of at least: the holder (400A), and the hand tool (10) 20
15. The kit (600) of claim 14, the container (602) is further sized and dimensioned to further house and limit free movement of a lancet driver tool, a plurality of lancets (606), a blood glucose reader (610), and a container (608) sized to contain glucose test strips 25

Patentansprüche

1. Halter (400A) zum Befestigen eines Handwerkzeugs (10) an einer Fläche (540), wobei der Halter (400A) umfasst:
- einen Saugnapf (430A), der auf der Fläche (540) positionierbar ist, wobei der Saugnapf (430A) einen zentralen Bereich aufweist; 35
- ein mit dem zentralen Bereich verbundener Bügel (432A), wobei der Bügel (432A) in einer vertikalen Richtung relativ zu der Fläche (540) bewegbar ist, um den Saugnapf (430A) zu verformen und einen Bereich mit niedrigem Druck zwischen dem Saugnapf (430A) und der Fläche (540) zu erzeugen, um den Saugnapf (430A) und den Bügel (432A) an der Fläche (540) zu befestigen, wobei der Bügel (432A) eine Nockeneingriffsfläche (434A) aufweist; 40
- einen Rahmen mit 45
- einer Gabel (414, 416), die so geformt ist, 50
- dass sie das Handwerkzeug (10) aufnimmt und stützt, wenn ein Handwerkzeug (10) auf den Halter (400A) gesetzt wird;
- einer Basis (400);
- einer Verlängerung (404A), welche die Basis (400) und die Gabel (414, 416) verbindet; und 55

einen Nockenstift (454), der innerhalb des Rahmens beweglich ist, wobei der Nockenstift (454) ein Nockenprofil (458) aufweist, das gleitend mit der Nockeneingriffsfläche (434A) des Bügels (432A) in Eingriff bringbar ist, um den Bügel (432A) vertikal von der Fläche (540) weg zu drücken oder es dem Bügel (432A) zu ermöglichen, sich zu der Fläche (540) hin zu bewegen, um den Druck zwischen dem Saugnapf (430A) und der Fläche (540) zu erhöhen oder zu verringern, **dadurch gekennzeichnet, dass** der Bügel (432A) durch einen elastischen Puffer (464) vorgespannt ist.

2. Halter (400A) nach Anspruch 1, wobei die Halterung (414, 416) mindestens zwei flexible Schenkel aufweist.
3. Halter (400A) nach Anspruch 1, wobei die Halterung (414, 416) mindestens einen Vorsprung (442A) oder eine Öffnung aufweist, und wobei das Handwerkzeug (10) das jeweils andere Element, nämlich eine passende Öffnung (444A) oder einen Vorsprung, aufweist, und wobei der Vorsprung (442A) und die Öffnung (444A) zusammenpassen, wenn das Handwerkzeug (10) in der Gabel (414, 416) positioniert ist, um dadurch eine vorbestimmte Position des Handwerkzeugs (10) innerhalb des Halters (400A) beizubehalten. 30
4. Halter (400A) nach Anspruch 1, wobei die Halterung (414, 416) mit dem Rahmen in einem nicht-orthogonalen Winkel in Bezug auf die Fläche (540) verbunden ist, wenn der Halter (400A) mit der Fläche (540) unter Verwendung des Saugnapfes (430A) verbunden ist.
5. Halter (400A) nach Anspruch 1, wobei sich der Stift (454) entlang einer Ebene parallel zur Fläche (540) bewegt, wenn der Halter (400A) an der Fläche (540) angebracht ist.
6. Halter (400A) nach Anspruch 1, wobei der Stift (454) durch eine oder mehrere Öffnungen (456) im Rahmen verläuft und wobei ein Ende des Stifts (454) einen freiliegenden Knopf (462) bildet, der gedrückt werden kann, um den Stift (454) zu bewegen.
7. Halter (400A) nach Anspruch 1, wobei sich das Nockenprofil (458) des Nockenstifts (454) in eine Tiefe innerhalb des Nockenstifts (454) erstreckt, die längs einer Längsachse des Nockenstifts (454) variiert.
8. Halter (400A) nach Anspruch 7, wobei das Nockenprofil (458) von der Fläche (540) weg weist, wenn der Halter (400A) auf der Fläche (540) positioniert ist.
9. Halter (400A) nach Anspruch 1, wobei die Nocken-

eingriffsfläche (434A) zur Montagefläche (540) hin weist, wenn der Halter (400A) auf der Montagefläche (540) positioniert ist.

10. Halter (400A) nach Anspruch 9, wobei das Nockenprofil (458) auf eine Fläche des Nockenstifts (454) ausgerichtet ist, die von der Montagefläche (540) weg weist, wenn der Halter (400A) auf der Fläche (540) positioniert ist, wodurch die Nockeneingriffsfläche (540) in Betriebeingriff mit dem Nockenprofil (458) steht, wenn der Stift (454) bewegt wird. 5
11. Halter (400A) nach Anspruch 1, wobei der Bügel (432A) in Richtung der Fläche (540) relativ zum Rahmen vorgespannt ist, wenn der Halter (400A) auf der Fläche (540) montiert ist. 10
12. Halter (400A) nach Anspruch 1, bei dem der Puffer (464) entlang eines Teils seiner Länge am Rahmen befestigt ist, wobei ein freier Teil in Eingriff mit dem Bügel (432A) verbleibt. 15
13. Halterung (400A) nach Anspruch 1, wobei der Bügel (432A) an dem Saugnapf (430A) angeformt ist oder der Bügel (432A) aus einem anderen Material besteht als der Saugnapf (430A). 20
14. Bausatz (600) mit dem Halter (400A) nach Anspruch 1, einem Handwerkzeug (10) und einem Behälter (602), der so bemessen und dimensioniert ist, dass er die freie Bewegung von zumindest dem Halter (400A), und dem Handwerkzeug (10) aufnimmt und begrenzt. 25
15. Bausatz (600) nach Anspruch 14, wobei der Behälter (602) ferner so bemessen und dimensioniert ist, dass er ein Lanzettenantriebswerkzeug, eine Vielzahl von Lanzetten (606), ein Blutzuckerlesegerät (610) und einen Behälter (608), der so ausgebildet ist, dass er Glukoseteststreifen enthält, aufnimmt und deren freie Bewegung begrenzt. 30

Revendications

1. Support (400A) pour le montage d'un outil à main (10) sur une surface (540), le support (400A) comprenant : 35
 - une ventouse (430A) pouvant être positionnée sur la surface (540), la ventouse (430A) ayant une zone centrale ; 40
 - une culasse (432A) raccordée à la zone centrale, la culasse (432A) étant mobile dans une direction verticale par rapport à la surface (540), afin de déformer la ventouse (430A) et créer une zone de faible pression entre la ventouse (430A) et la surface (540), afin de fixer la ventouse 45

(430A) et la culasse (432A) sur la surface (540), la culasse (432A) comprenant une surface de mise en prise de came (434A) ;
un bâti comprenant :

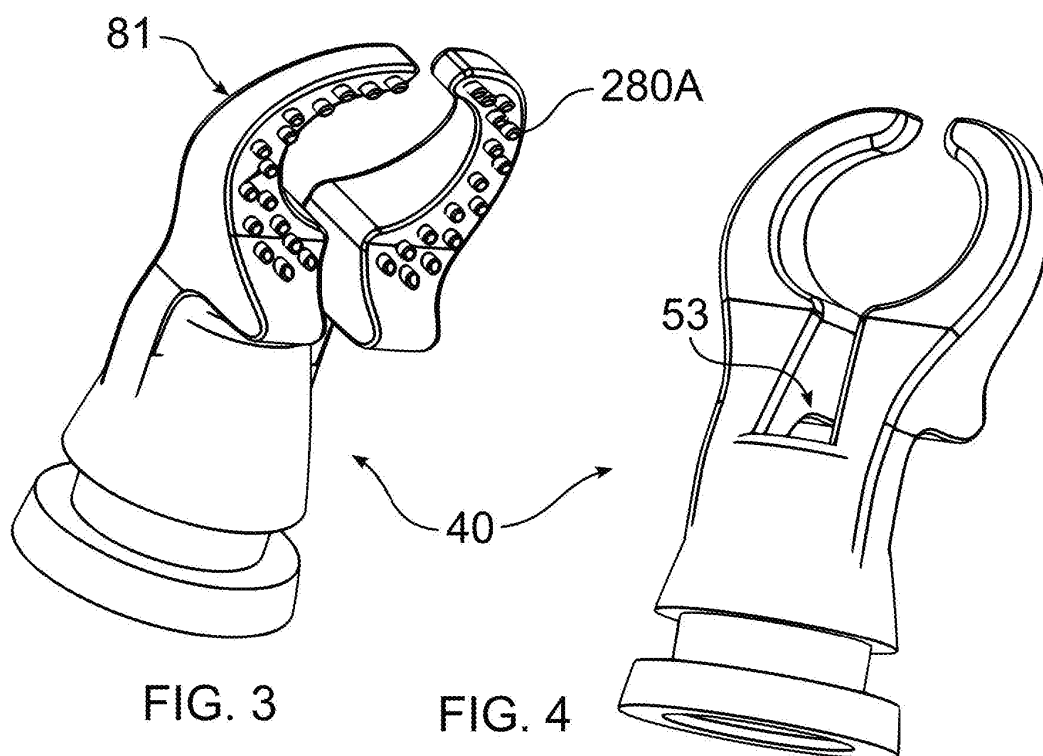
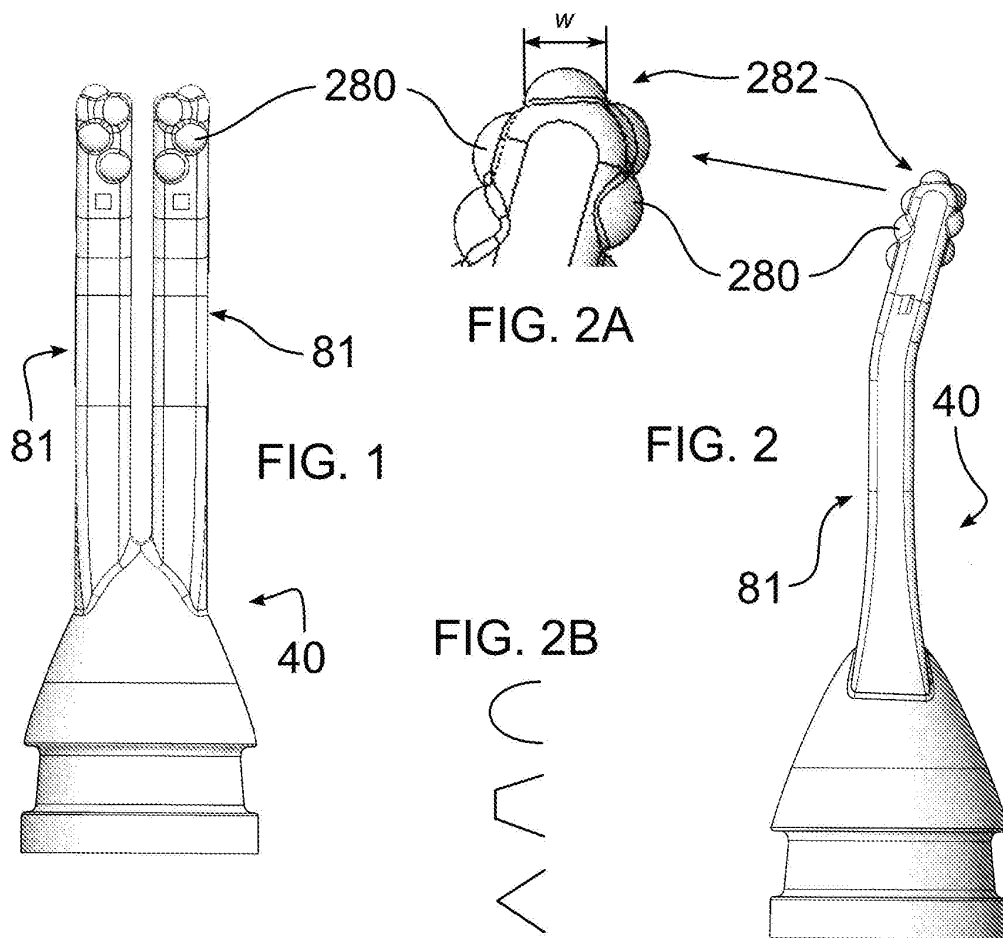
un berceau (414, 416) formé pour recevoir et supporter l'outil à main (10) lorsqu'un outil à main (10) est placé sur le support (400A) ;
une base (400) ;
une extension (404A) raccordant la base (400) et le berceau (414, 416) ; et
un axe de came (454) mobile à l'intérieur du bâti, l'axe de came (454) comprenant un profil de came (458) pouvant se mettre en prise, par coulisement, avec la surface de mise en prise de came (434A) de la culasse (432A) afin de pousser verticalement la culasse (432A) à l'opposé de la surface (540) ou de permettre à la culasse (432A) de se déplacer vers la surface (540) pour augmenter ou réduire la pression entre la ventouse (430A) et la surface (540),

caractérisé en ce que :

la culasse (432A) est sollicitée par un butoir résilient (464) .

2. Support (400A) selon la revendication 1, dans lequel le berceau (414, 416) comprend au moins deux pat-
tes flexibles. 45
3. Support (400A) selon la revendication 1, dans lequel le berceau (414, 416) comprend au moins l'une parmi une saillie (442A) ou une ouverture, et dans lequel l'outil à main (10) comprend l'autre parmi une ouverture de couplage (444A) ou une saillie, respective-
ment et dans lequel la saillie (442A) et l'ouverture (444A) se couplent lorsque l'outil à main (10) est positionné à l'intérieur du berceau (414, 416), afin de maintenir ainsi une position prédéterminée de l'outil à main (10) à l'intérieur du support (400A). 50
4. Support (400A) selon la revendication 1, dans lequel le berceau (414, 416) est raccordé au bâti à un angle non orthogonal par rapport à la surface (540) lorsque le support (400A) est raccordé à la surface (540) à l'aide de la ventouse (430A). 55
5. Support (400A) selon la revendication 1, dans lequel l'axe (454) se déplace le long d'un plan parallèle à la surface (540) lorsque le support (400A) est monté sur la surface (540).
6. Support (400A) selon la revendication 1, dans lequel l'axe (454) passe à travers une ou plusieurs ouver-
tures (456) dans le bâti, et dans lequel une extrémité de l'axe (454) forme un bouton (462) exposé qui peut être enfoncé afin de déplacer l'axe (454).

7. Support (400A) selon la revendication 1, dans lequel le profil de came (458) de l'axe de came (454) s'étend à une profondeur à l'intérieur de l'axe de came (454) qui varie le long d'un axe longitudinal de l'axe de came (454). 5
8. Support (400A) selon la revendication 7, dans lequel le profil de came (458) est orienté à l'opposé de la surface (540), lorsque le support (400A) est positionné sur la surface (540) . 10
9. Support (400A) selon la revendication 1, dans lequel la surface de mise en prise de came (434A) est orientée vers la surface de montage (540) lorsque le support (400A) est positionné sur la surface de montage (540). 15
10. Support (400A) selon la revendication 9, dans lequel le profil de came (458) est orienté sur une face de l'axe de came (454) qui est orientée à l'opposé de la surface de montage (540), lorsque le support (400A) est positionné sur la surface (540), moyennant quoi la surface de mise en prise (540) est en mise en prise opérationnelle avec le profil de came (458), lorsque l'axe (454) est déplacé. 20
25
11. Support (400A) selon la revendication 1, dans lequel la culasse (432A) est sollicitée dans la direction de la surface (540) par rapport au bâti, lorsque le support (400A) est monté sur la surface (540). 30
12. Support (400A) selon la revendication 1, dans lequel le butoir (464) est fixé sur le bâti le long d'une partie de sa longueur, laissant une partie libre en mise en prise avec la culasse (432A). 35
13. Support (400A) selon la revendication 1, dans lequel la culasse (432A) est co-moulée sur la ventouse (430A) ou la culasse (432A) est réalisée avec un matériau différent de la ventouse (430A). 40
14. Kit (600) comprenant le support (400A) selon la revendication 1, un outil à main (10) et un récipient (602) ayant une taille et des dimensions pour loger et limiter le mouvement libre d'au moins le support (400A) et l'outil à main (10) . 45
15. Kit (600) selon la revendication 14, le récipient (602) a en outre une taille et des dimensions pour loger et limiter en outre le mouvement libre d'un outil de commande de lancette, une pluralité de lancettes (606), un lecteur de glycémie (610) et un récipient (608) ayant une taille pour contenir les bandelettes de test de glycémie. 50
55



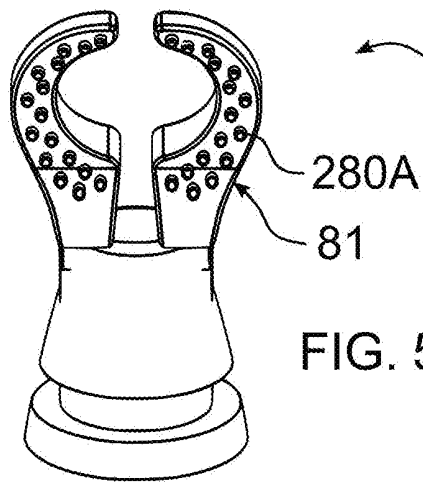


FIG. 5

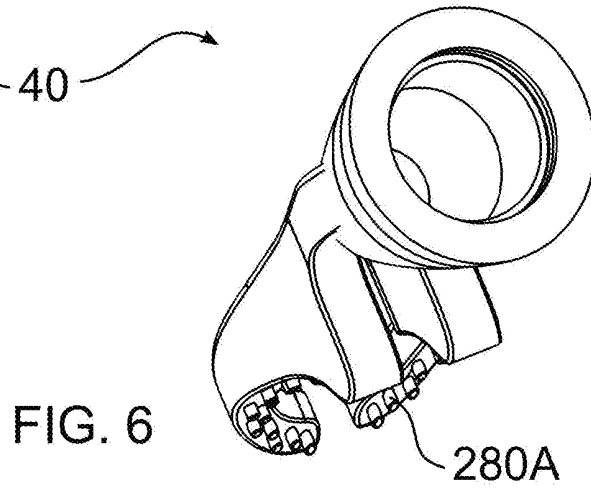


FIG. 6

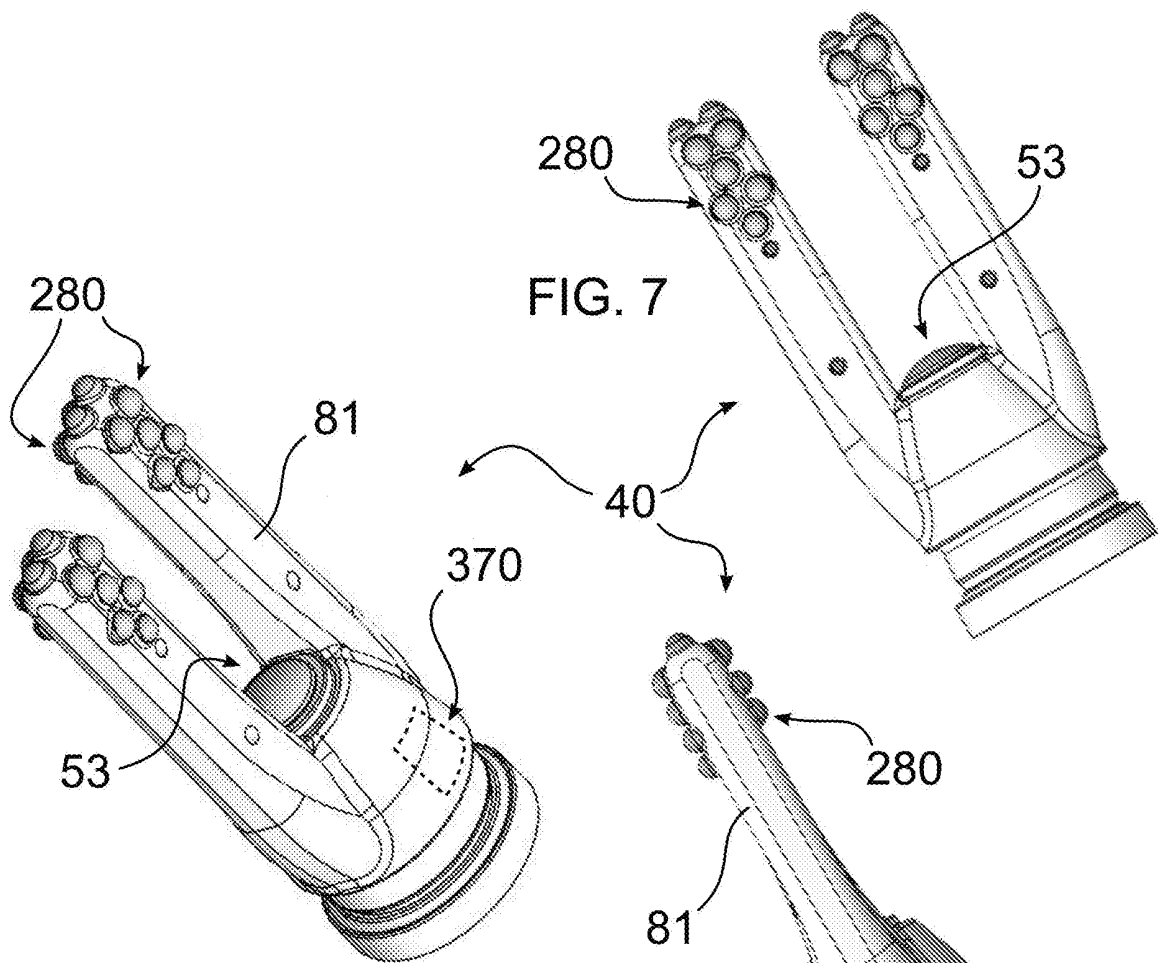


FIG. 7

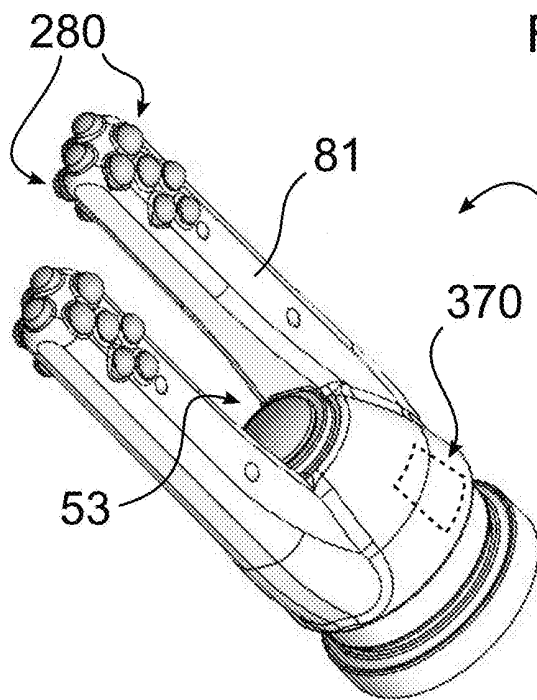


FIG. 8

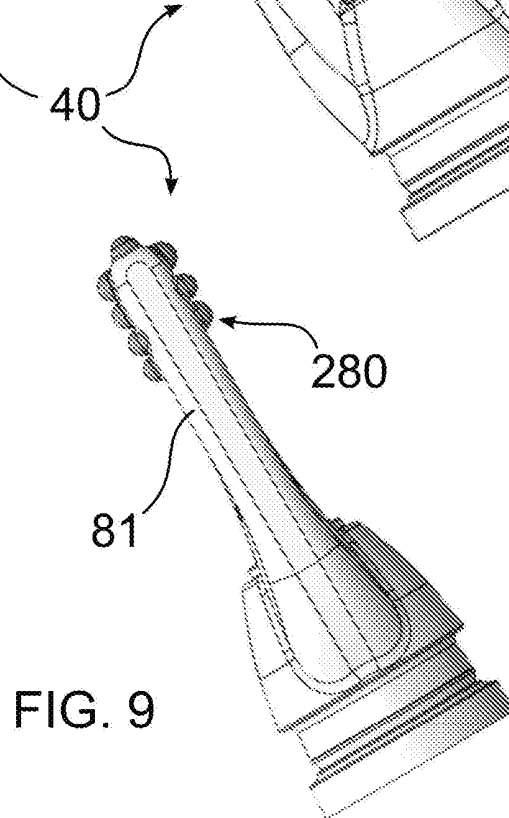
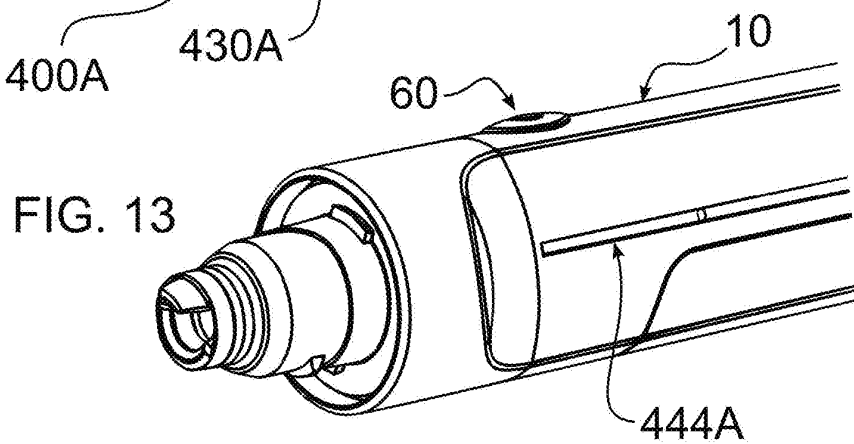
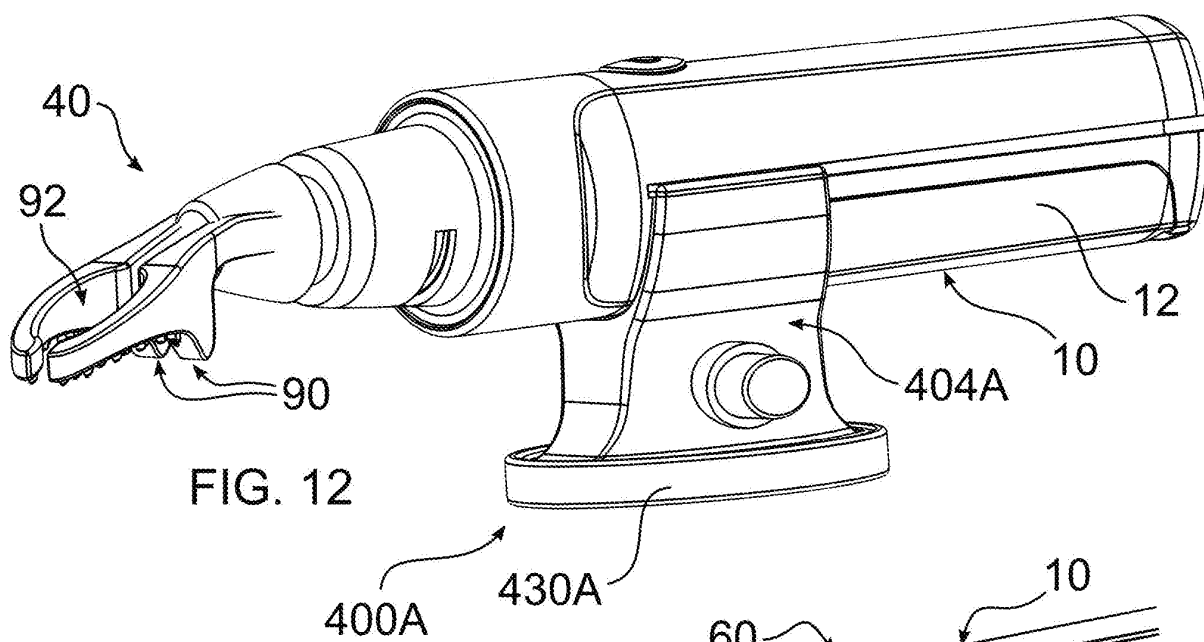
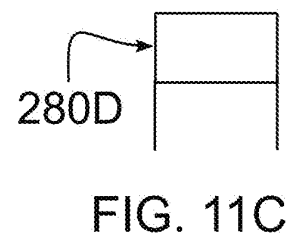
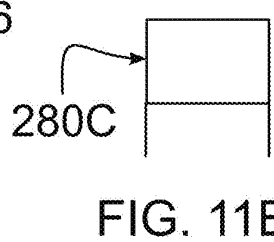
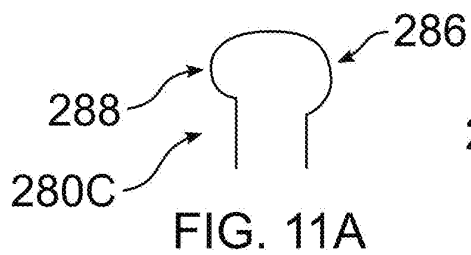
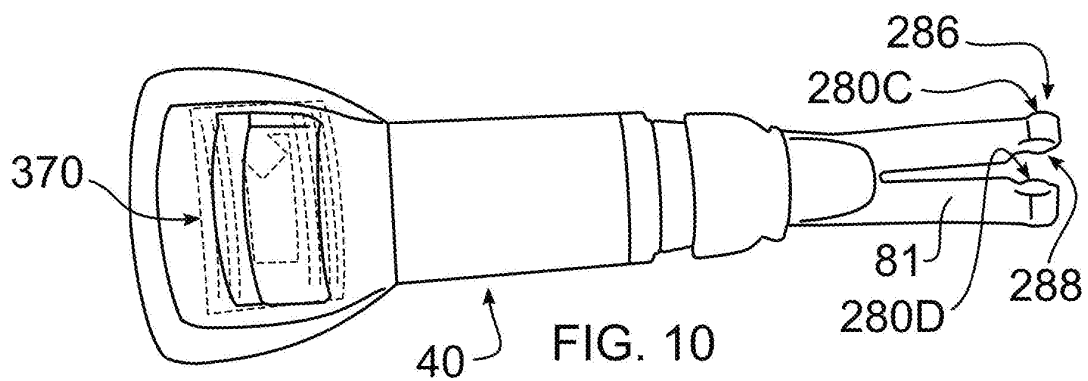
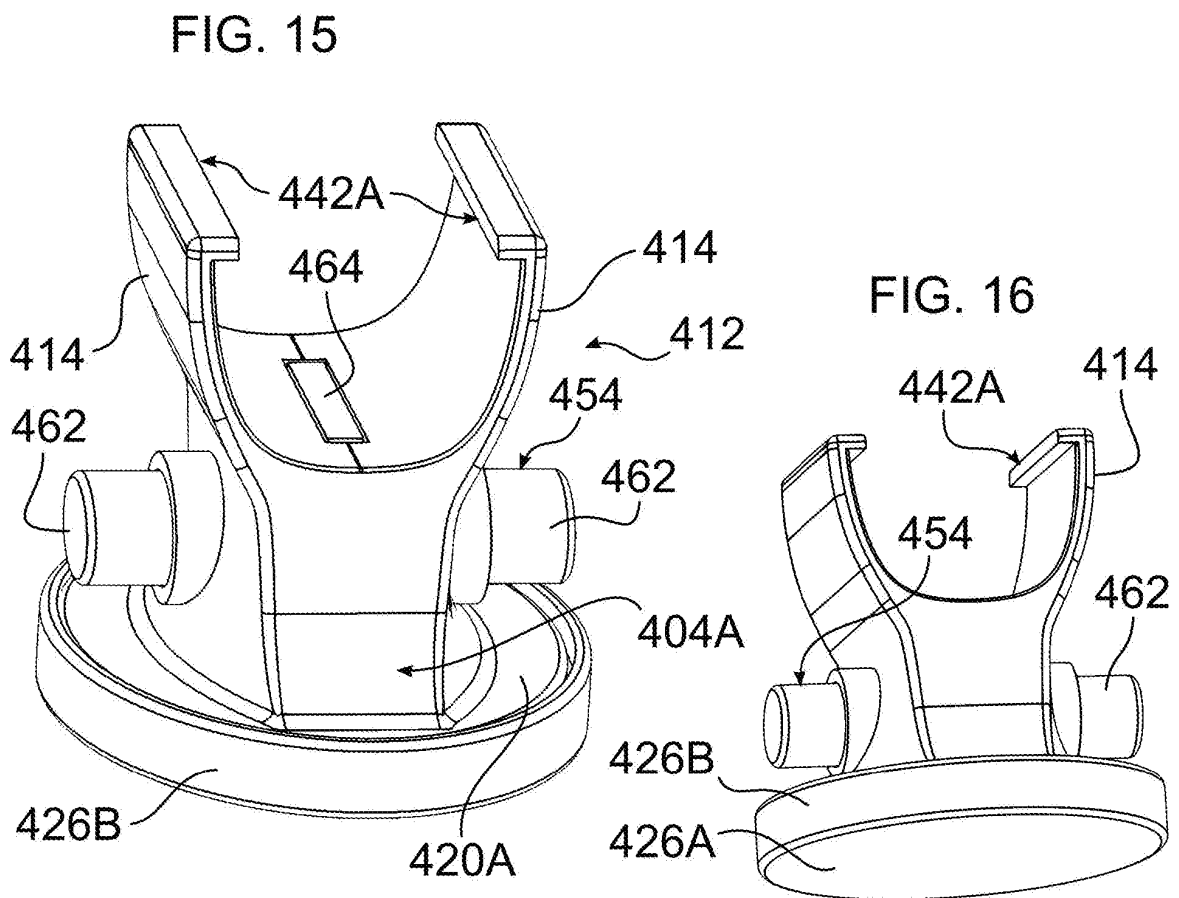
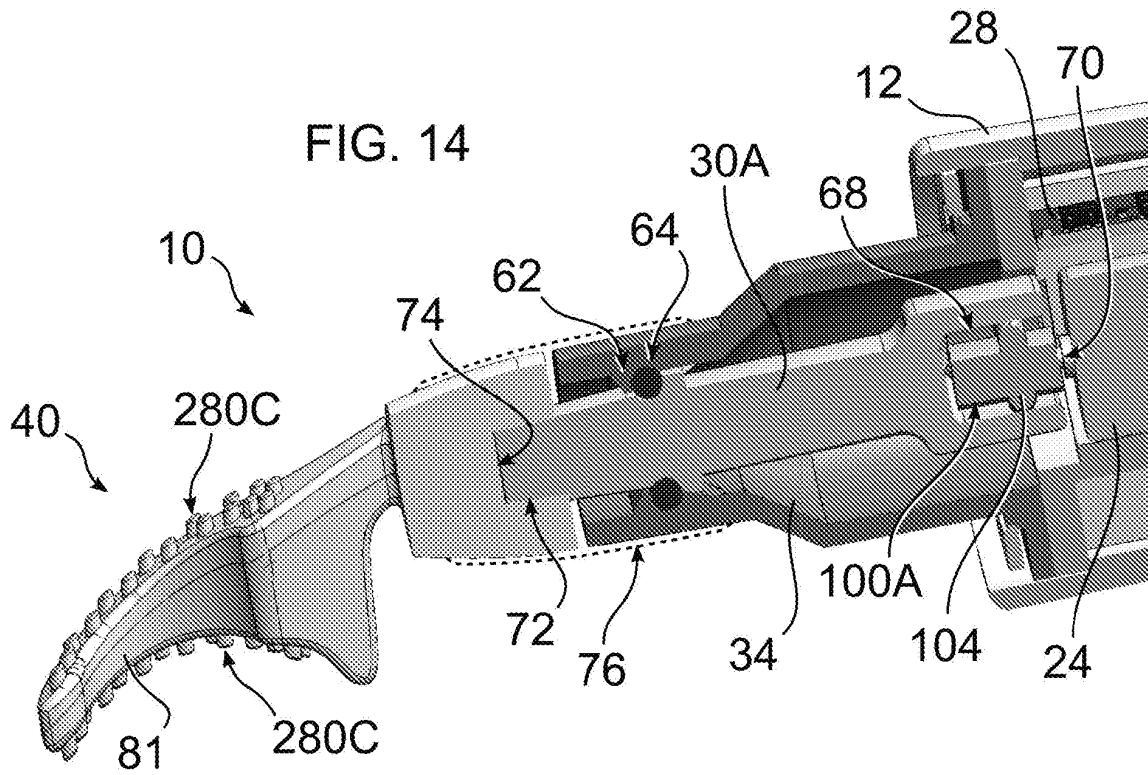
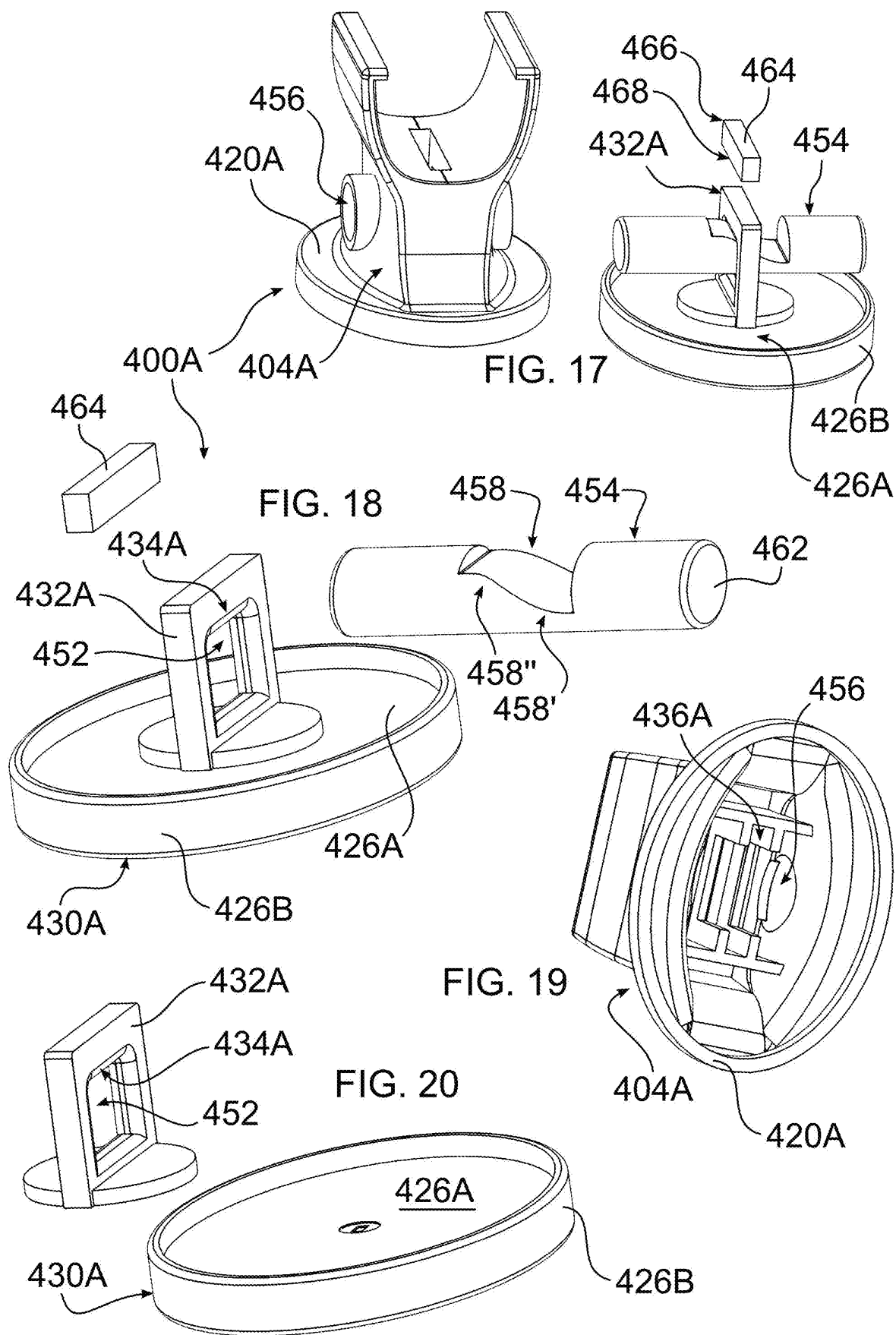


FIG. 9







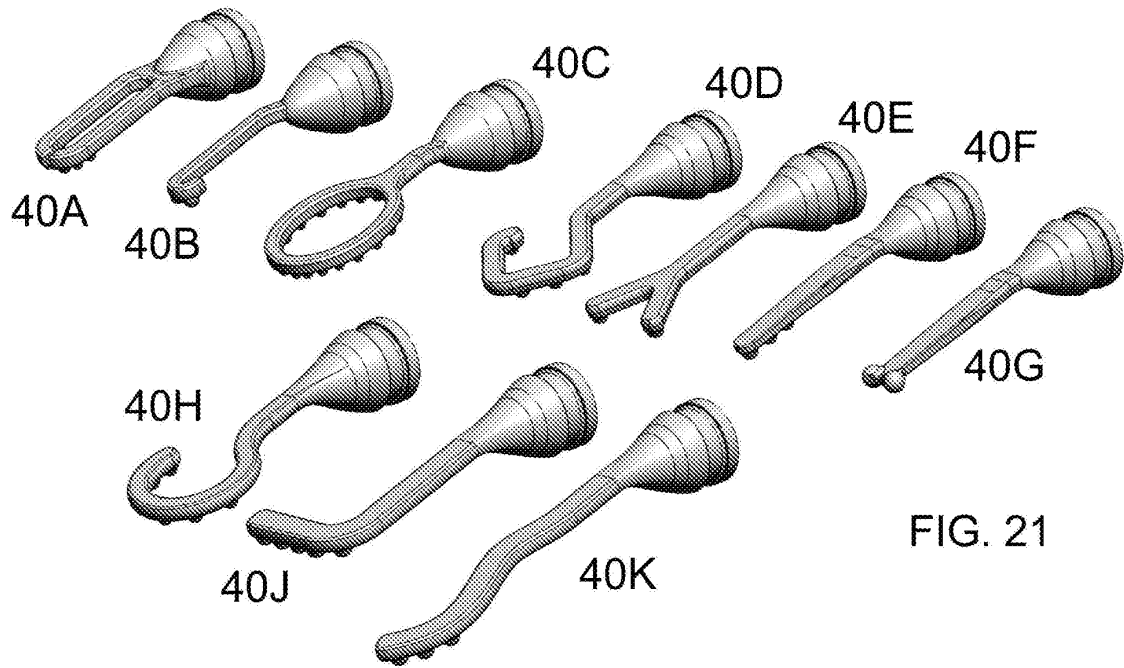


FIG. 21



FIG. 22

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2009108153 A1 [0003]
- US 66149704 [0015]
- US 70775405 [0015]
- US 0533769 W [0015]
- US 61163945 [0015]
- US 0966033 W [0015]
- US 1028858 W [0015]
- US 17967411 [0015]
- US 8668664 B [0015]
- US 22578211 [0015]
- US 8662952 B [0015]
- US 25357211 [0015]
- US 1253744 W [0015]
- US 61531264 [0015]
- US 1253943 W [0015]
- US 61909544 [0015]
- US 1467587 W [0015]
- US 62155769 [0015]
- US 80353515 [0015]
- US 62208860 [0015]
- US 2016029971 W [0015]
- WO 2016178952 A1 [0015]
- US 2016029938 W [0015]
- WO 2016178941 A1 [0015]